

Alabama Citrus Industry Meeting

Recent Citrus Canker Findings
December 9, 2021



Citrus Canker

- Citrus canker is a citrus disease caused by the bacterium *Xanthomonas axonopodis*.
- Citrus canker is a highly contagious citrus disease.
- Regulated by both USDA and ADAI
- While not harmful to humans, canker significantly affects the vitality of citrus trees, causing leaves and fruit to drop prematurely.
- A fruit infected with canker is safe to eat but has reduced marketability as fresh fruit.

History of Citrus Canker

- Citrus canker was first identified in the United States near the Florida-Georgia border in 1910.
- From 1910 to 1931, 257,745 grove trees and 3,093,110 nursery trees in 26 counties were destroyed.
- Canker was considered eradicated in 1933.
- On September 28, 1995, canker was again discovered in Miami-Dade County, Florida.

History of Citrus Canker (continued)

- Despite a 10-year monumental effort to eradicate the disease from Florida, a combination of programmatic challenges and a series of unprecedented storms in 2004 and 2005 spread the disease to the point where eradication was no longer possible.
- Eradication efforts in Florida ended on January 10, 2006, when the Secretary of Agriculture determined eradication was not possible.
- Efforts in Florida shifted to containing the disease and establishing criteria under which fruit and nursery stock could safely move out of Florida.
- Citrus canker was found in Louisiana in 2014, in Texas in 2016, and in Alabama in 2021. ADAI is working with our USDA partners to contain the disease in all three states.

Citrus Canker Symptoms

- Leaf Lesions:
 - Young lesions: Raised, particularly on lower surface
 - Older lesions: corky and crateriform, and roughly circular.
 - The center of the lesion may fall out producing a shot hole effect.
 - Water-soaked margins, yellow halos





Citrus Canker Symptoms

Fruit Lesions:

- Young lesions raised, blister-like, tan, may have yellow halos
- Older lesions dark brown to black with sunken, corky centers, may have yellow halos.
- Old lesions often have a gray appearance.
- The internal quality of the fruit is not affected.



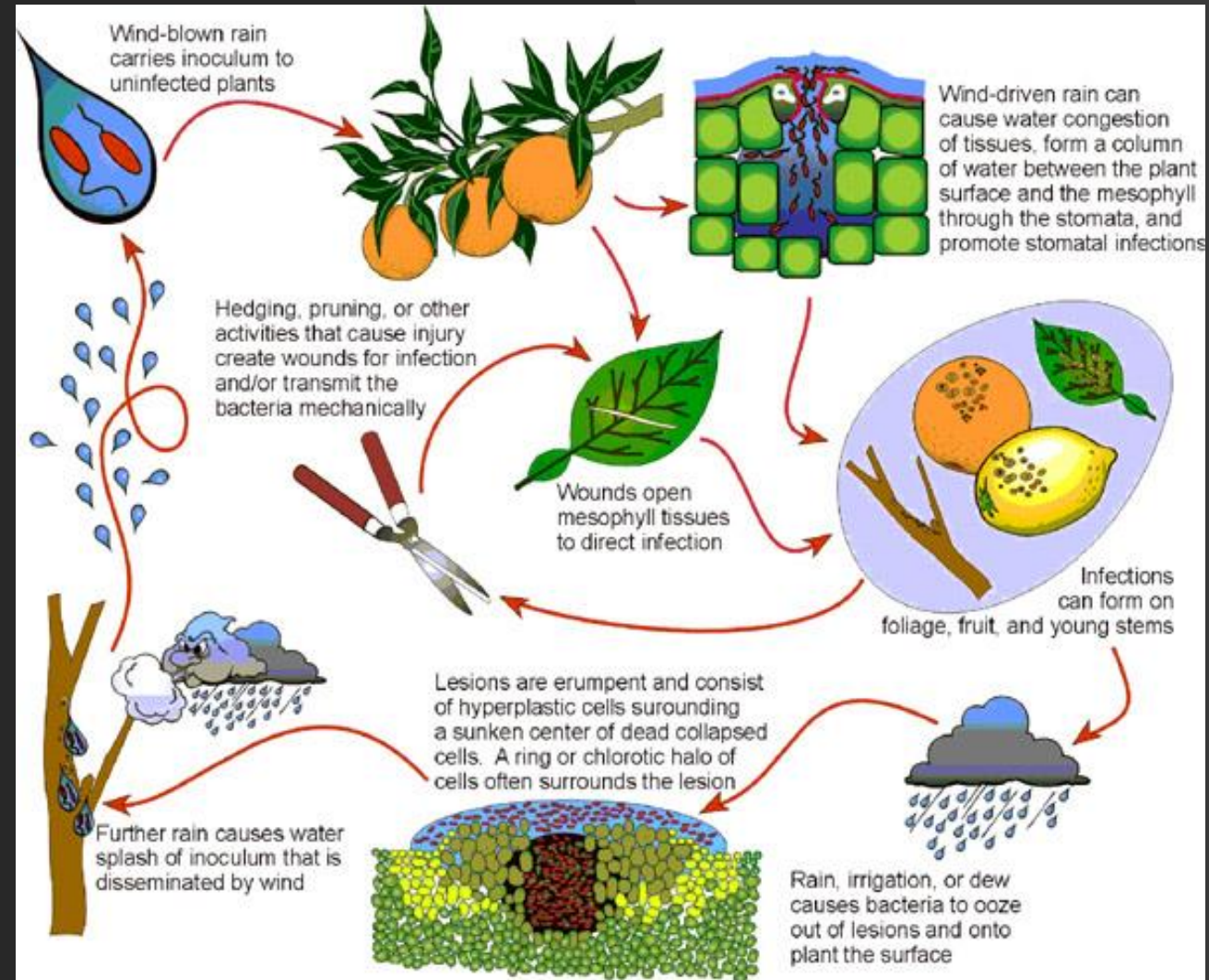
Citrus Canker Symptoms

Stem and Twig Lesions

- Stem lesions indicate infection has been present for at least a year
- Serve as a reservoir for persistent inoculum and can produce inoculum for up to four years
- Same color as the branch but have a raised, wart-like surface
- May be surrounded by oily or water-soaked margins
- Older lesions are scabby or corky

Citrus Canker Spread & Movement

- Spreads rapidly via wind-driven rain, irrigation, and water splash.
- Contaminated tools and equipment, nursery stock, people, and birds can spread citrus canker
- Hurricanes and severe weather events of strong winds and rain can spread citrus canker long distances.
- According to the Post-hurricane Analysis of Citrus Canker, conducted by Tim R. Gottwald & Michael Irey, Winds ≥ 18 mph and rainfall $\geq \frac{1}{8}$ in/hr can spread the inoculum up to 35 miles



Citrus Canker Decontamination Procedures

- To prevent the spread of citrus canker, personnel and equipment near or in contact with any citrus plant material must be decontaminated with a USDA-APHIS approved product.
- Risks of acquiring and dispersing citrus canker are greatest when diseased citrus plant material and surrounding vegetation are wet.





Decontamination of personnel & equipment

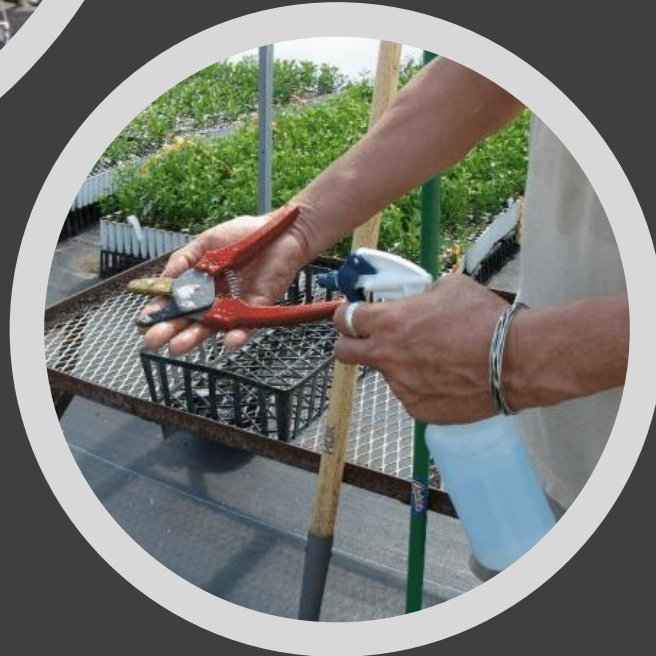
- When you first arrive at a grove, decontaminate yourself
- Grove workers and managers should be equipped with spray bottles of both personal and equipment decontamination solution

Decontamination of Personnel

- Decontamination solution should be applied to clothing, legs, hat, and shoes
- Small items and tools that come into contact with citrus plants should be decontaminated as well (pen, hand lens, glasses, pocketknife, etc.)
- Before decontamination, remove any limbs, fruit, soil, or leaves from yourself, vehicles, and all equipment. Leave any debris on the property to prevent further spread



Decontamination of Equipment



- Clean all vehicles, equipment, picking sacks, clothing and hand tools of fruit, leaves, limbs, soil and debris prior to decontamination.
- Equipment and vehicle surfaces (including undercarriages) should be regularly inspected for plant debris and soil residue, pressure washed with detergent, and then further disinfected with any approved equipment decontamination products
- Decontamination solution should be applied to all surfaces to the point of runoff.
- When applying, begin spraying at the top of the vehicle and/or equipment and move downward



Approved Destruction Methods

- Burial, burning, incineration
- Where possible, infected trees should be cut down and buried or burned on site
- Whenever infected host plant material is buried on site, it must be covered with at least 12 inches of soil.
- After plant disposal, all equipment and vehicles must be decontaminated with approved decontaminants
- All equipment, vehicles, personnel, and personal items, including hands, hats, clothing and shoes, must be decontaminated with approved decontaminants.

Transport and Disposal of Leaves and Debris:

- Plant material from infected hosts must be disposed of by burning, incineration or burial in an approved landfill or on site
- When plant material is transported for burning, burial, or incineration, it must be double bagged, decontaminated, and moved in an enclosed vehicle.
- The cargo area and exterior of the vehicle must be decontaminated following this movement



Disposal of Soil or Potting Media:

- Potting soil or media from infected properties shall be handled in one of the following manners:
 - The potting soil that is incinerated with the infected materials can be disposed of in a dumpster.
 - The potting soil or media may be buried at the nursery site or other approved location, such as a landfill, provided it is covered with a minimum of 12 inches of soil.



Types of Citrus Surveys



Positive field test sample for citrus canker

Annual Survey

- Routine survey for all regulated citrus pests and diseases
- Conducted twice a year in each area that grows citrus: Mobile County, Baldwin County and the Wiregrass area
- Focuses on commercial orchards

Delimiting Survey

- Required to establish a county-by-county quarantine
- Door to door survey of every citrus tree within a 5-mile radius around positive canker sites.
- In addition to ADAI personnel, USDA personnel come in from all over the country to assist.
- Costs ~\$27,000 for two weeks of delimiting survey in ADAI personnel costs (6 of 12 inspectors).

Distribution of Positive Citrus Canker Sites

- Nursery Dealers
- Citrus Orchards
- Residential Citrus
- Flea Market (only site in Mobile)
- ADAI is working with each positive site to confirm all trees infected with citrus canker are destroyed in an approved manner.

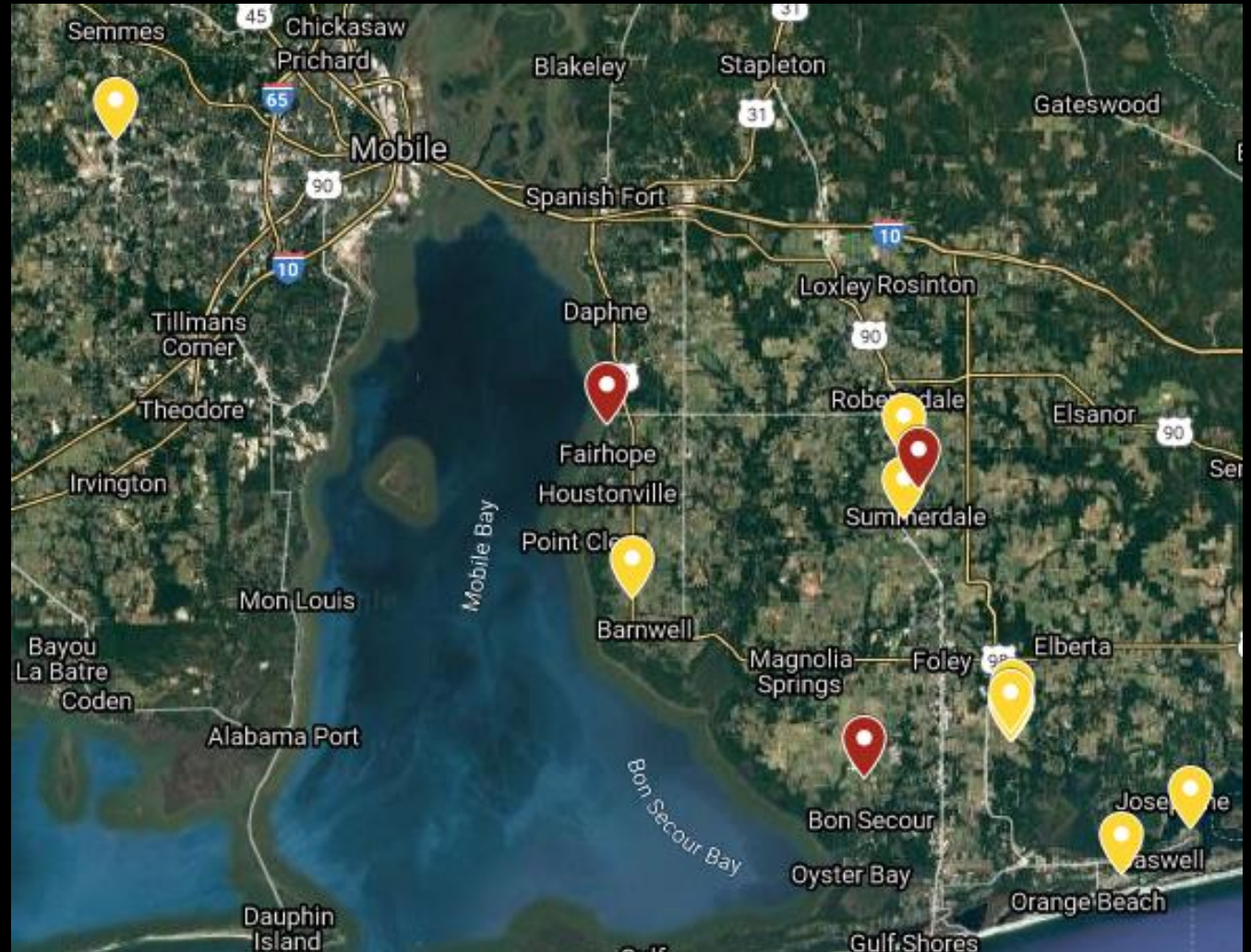
Map Legend:



Destruction has not been confirmed yet.

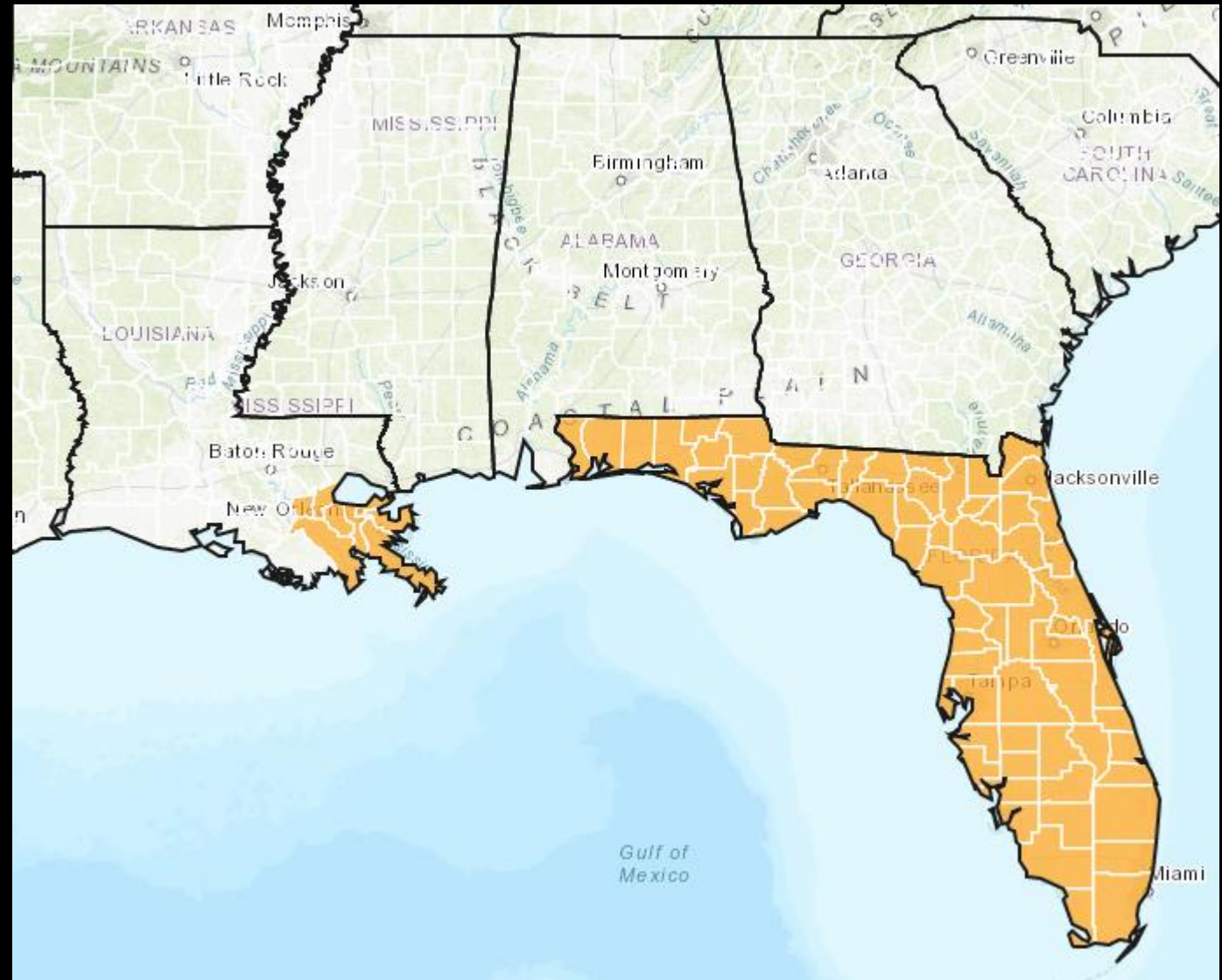


Destruction has been confirmed.



Citrus Canker Quarantine

- Citrus Canker is a federal- and state-regulated pathogen, so a quarantine is required to prevent or slow the spread of the disease
- Two options for quarantine are possible: state-wide and county-by-county



Existing Federal Quarantine for Citrus Canker (not including TX)

Effect on Nurseries of Citrus Canker Quarantine Options

Statewide Quarantine

- To ship citrus nursery stock out of state, nurseries will be required to grow plants in an exclusion facility that has a spray system for personal decontamination.
- Allows all Alabama nurseries to ship citrus plants within the state without an exclusion facility
- Covered by an annual cooperative agreement between ADAI & USDA



Effect on Nurseries of Citrus Canker Quarantine Options

County by County Quarantine



- Nurseries outside of the county-by-county quarantine area do not require exclusion facilities to ship plants to non-citrus growing states.
- Nurseries inside the county-by-county quarantine area will require an APHIS approved exclusion facility to ship out of the quarantined area.
- The quarantine area is likely to continuously expand
- Requires a delimiting survey which can cost ~\$27,000 for two weeks in ADAI personnel costs, not including the USDA personnel

Citrus Canker Quarantine & Nurseries

Structure: To move citrus nursery stock outside of the quarantined area, citrus nursery stock must be grown in an APHIS approved structure with a spray system for personal decontamination. The structure must be designed and constructed to exclude citrus canker and be resistant to wind-blown rain.

Sanitation: Prior to entering the approved structure, personnel must disinfect hands, arms, clothing, and footwear with an APHIS approved product, by utilizing a spray system. Vehicles, equipment, and other articles used to handle or move citrus must also be treated with an approved product.

Inspection: Plants in the approved structure destined for interstate movement must be visually inspected for symptoms by APHIS or ADAI every 30 days. If symptomatic plants are found, they must be tested at an APHIS approved lab.

Effect on **Fruit** Producers of Citrus Canker Quarantine Options

Statewide

- To move fruit out of the quarantined area, citrus fruit must be processed at an APHIS approved packing house
- Similar to SOS protocol
- Must clean, brush, and sanitize fruit before shipping interstate (Some states require this for incoming citrus fruit for even non-quarantined states)
- Inspections conducted every 30 days by federal or state inspectors

County by County

- Already in place for Mobile and Baldwin Counties due to SOS quarantine
- Inspections conducted every 30 days by federal or state inspectors



Citrus Canker Quarantine & Fruit Producers

- Citrus fruit from a citrus canker quarantined area can move interstate with a certificate to all states provided it has met all conditions of the CC/SOS Federal Order and is treated as follows:
- Washed
- Brushed
- Surface disinfested with an APHIS approved chemical treatment



Interstate movement of citrus fruit from a quarantined area

Quarantine Requirements:

(a) Regulated fruit produced in a quarantined area or moved into a quarantined area for packing may be moved interstate with a certificate issued and attached in accordance with [§ 301.75-12](#) *if all of the following conditions are met:*

- (1) The regulated fruit was packed in a commercial packinghouse whose owner or operator has entered into a compliance agreement with APHIS in accordance with [§ 301.75-13](#).
- (2) The regulated fruit was treated in accordance with [part 305 of this chapter](#).
- (3) The regulated fruit is free of leaves, twigs, and other plant parts, except for stems that are less than 1 inch long and attached to the fruit.
- (4) If the fruit is repackaged after being packed in a commercial packinghouse and before it is moved interstate from the quarantined area, the person that repackages the fruit must enter into a compliance agreement with APHIS in accordance with [§ 301.75-13](#) and issue and attach a certificate for the interstate movement of the fruit in accordance with [§ 301.75-12](#).

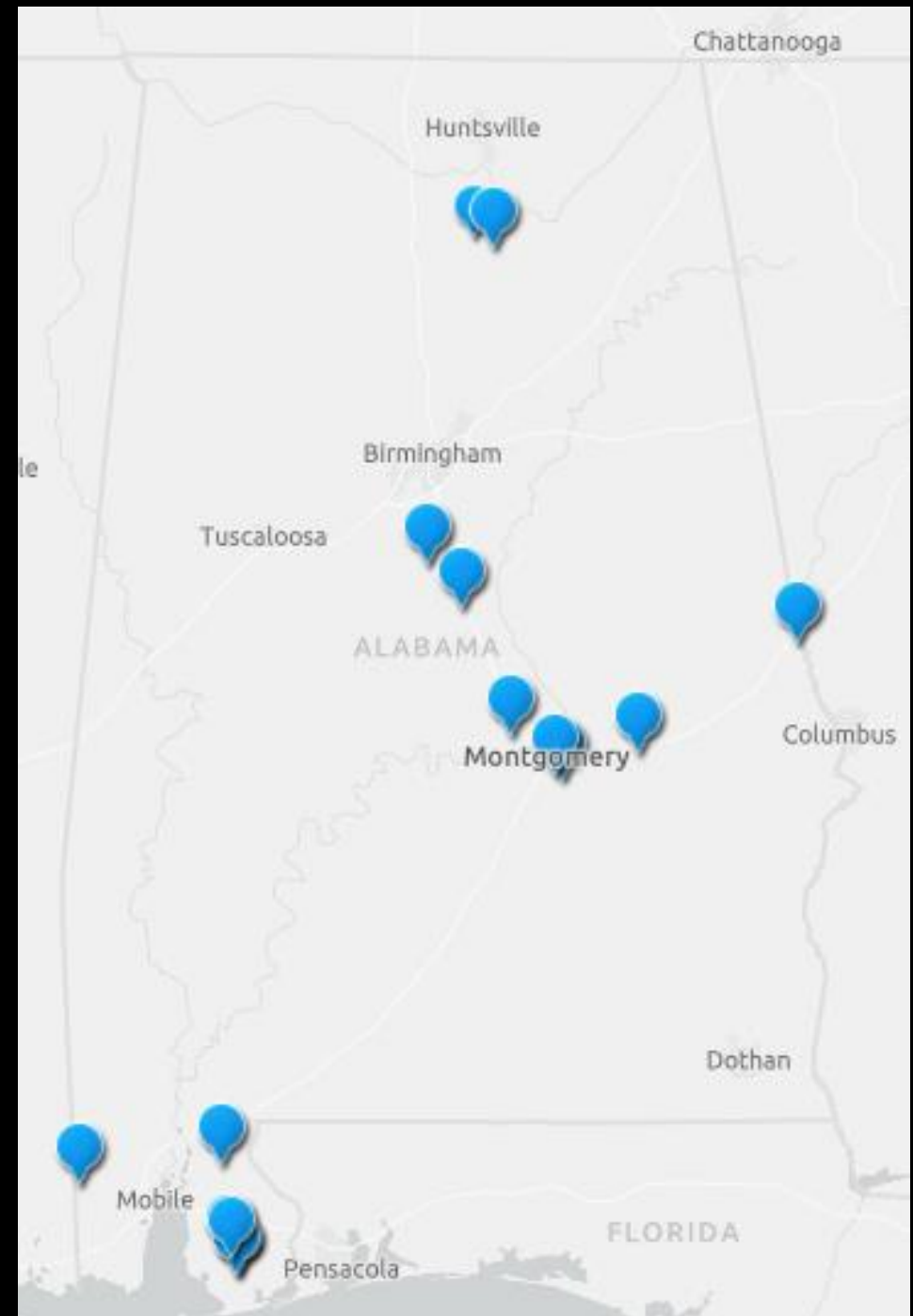


Interstate movement of citrus fruit from a quarantined area (continued)

- (b) Fruit that is not eligible for movement under [paragraph \(a\)](#) of this section may be moved interstate only for immediate export. The regulated fruit must be accompanied by a limited permit issued in accordance with [§ 301.75-12](#) and must be moved in a container sealed by APHIS directly to the port of export in accordance with the conditions of the limited permit.

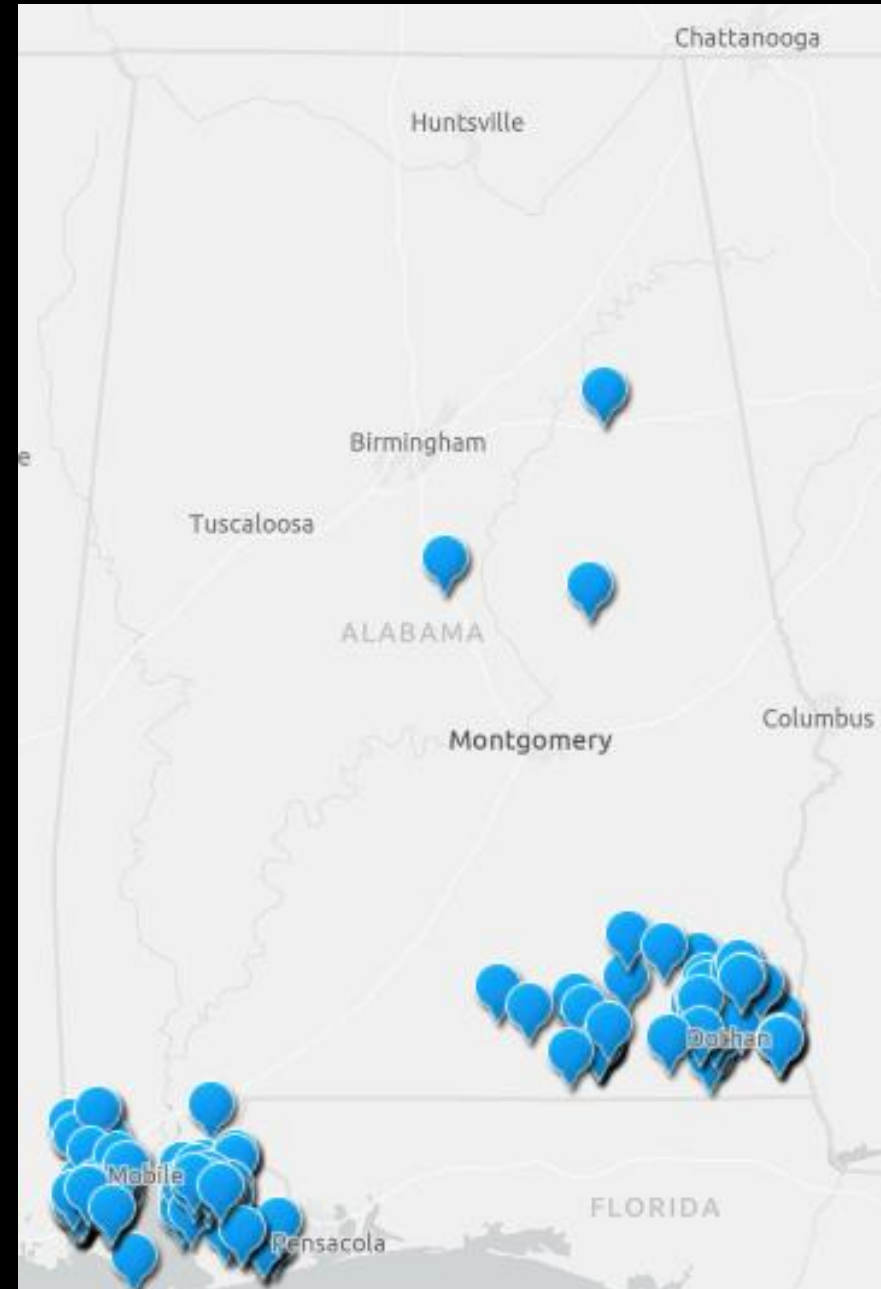
Citrus Plant Growers

- 13 nursery growers/dealers registered and under compliance to sell citrus in the state.
- 6 of those are within the HLB & SOS quarantine area and cannot ship out of Mobile or Baldwin county.



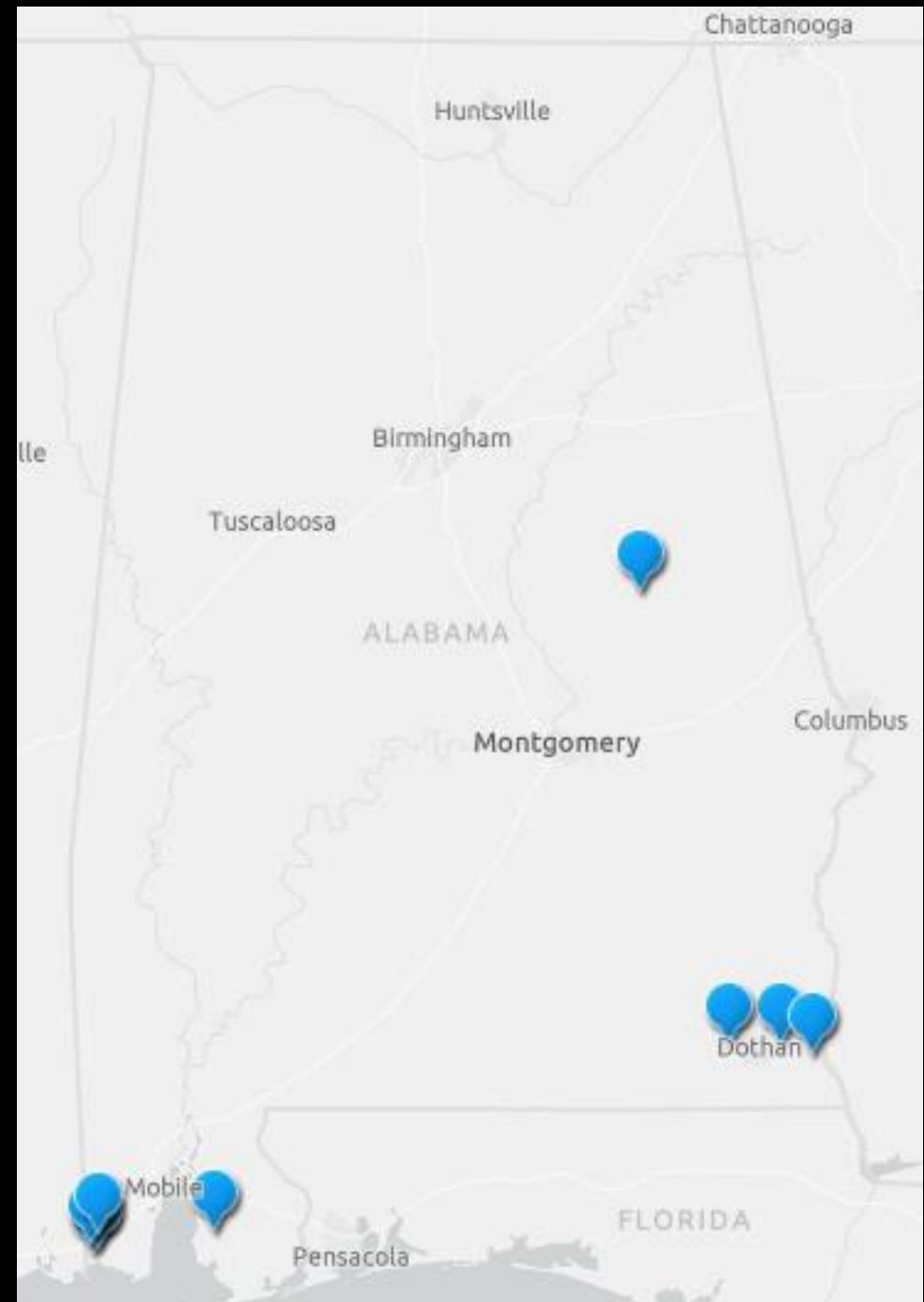
Citrus Fruit Growers

Approximately 152
citrus fruit growers in
the state



Known Citrus Packing Houses

- Mobile County: 4
- Baldwin County: 1
- Wiregrass Area: 3
- Alexander City: 1



References

- APHIS approved Packing House Procedures for Sweet Orange Scab
https://www.aphis.usda.gov/plant_health/plant_pest_info/citrus/citrus-downloads/sweet-orange-scab/sos-packing-house-procedures.pdf
- Interstate Movement of Citrus Nursery Stock from Areas Quarantine for Citrus Canker, Citrus Greening, and/or Asian Citrus Psyllid
https://www.aphis.usda.gov/plant_health/plant_pest_info/citrus/citrus-downloads/citrus-nursery-stock/citrus-nursery-stock-protocol-interstate-movement.pdf